What is claimed is:

1. A fire-retardant composite structure comprising:

a fire retardant layer having a porous fluoropolymer layer; and

a matrix resin.

2. The fire-retardant composite structure according to claim 1, further comprising:

a structural layer;

wherein said matrix resin is impregnated at least partially into said porous fluoropolymer layer and said structural layer such that said porous fluoropolymer layer and said structural layer are attached to one another.

3. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is comprised of at least one selected from the group consisting of expanded PTFE, woven fabric, non-woven fabric, felt, fiber, and powder.

4. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is comprised of non-melt-processable resin.

5. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is comprised of PTFE.

6. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is comprised of PTFE fibers.

7. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is a non-woven fabric comprised of PTFE fibers.

8. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is a blended combination comprised of PTFE fibers and one or more other materials.

9. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is comprised of modified PTFE.

10. The fire-retardant composite structure according to claim 9, wherein said modified PTFE is created by copolymerizing PTFE with at least one selected from the group

consisting of hexafluoro propane, chloro trifluoro ethylene, perfluoro(alkyl vinyl ether), perfluoro(alkoxy vinyl ether), trifluoro ethylene, perfluoro alkyl ethylene, vinylidene fluoride, and ethylene.

11. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer has a porosity between approximately 10% and approximately 90%.

12. The fire-retardant composite structure according to claim 1, wherein the porosity of said porous fluoropolymer layer is between approximately 25% and approximately 85%.

13. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer has a mean CP porous diameter of at least 0.5 μm.•

14. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer has a mean CP porous diameter of at least 4.5 μm.•

15. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer includes pores or gaps that are sized to allow the matrix resin to flow therein.

16. The fire-retardant composite structure according to claim 1, wherein said porous fluoropolymer layer is attached to one or more other layers prior to composite fabrication.

17. The fire-retardant composite structure according to claim 1, wherein said matrix resin is at least one selected from the group consisting of vinyl ester resin, vinyl ester bromide resin, epoxy resin, unsaturated polyester resin, epoxy acrylate resin, polyimide resin, phenolic, and bismaleimide resin.

18. The fire-retardant composite structure according to claim 2, wherein said structural layer comprises at least one selected from the group consisting of glass fiber, carbon fiber, alumina fiber, silicon carbide fiber, boron fiber, p-Aramid fiber, polybenzimidazol fiber, polyetheretherketone, graphite, and poly-p-phenylbenz-bisthiazol fiber.

19. The fire-retardant composite structure according to claim 2, wherein said structural layer includes first and second reinforcement layers and a core layer, said core layer being provided between said first and second reinforcement layers, such that one or both of said porous fluoropolymer layer or layers are provided against or close to an outside surface of the composite structure in order to provide fire protection.

20. The fire-retardant composite structure according to claim 2, wherein said fire retardant layer further includes an intumescent layer.

21. The fire-retardant composite structure according to claim 20, wherein said intumescent layer is located between said porous fluoropolymer layer and said structural layer.

22. The fire-retardant composite structure according to claim 20, wherein said fire retardant layer further includes a restraining layer.

23. The fire-retardant composite structure according to claim 22, wherein said restraining layer is interposed between said intumescent layer and said porous fluoropolymer layer in order to strengthen the fire retardant layer and hold both layers in place during exposure to heat and fire.

24. The fire-retardant composite structure according to claim 22, wherein said porous fluoropolymer layer is combined with said restraining layer prior to composite fabrication.

25. The fire-retardant composite structure according to claim 22, wherein said porous fluoropolymer layer is combined with said restraining layer by entanglement prior to composite fabrication.

26. The fire-retardant composite structure according to claim 25, wherein said entanglement is performed by mechanical means such as needle punching, or hydro-entangling.

27. The fire-retardant composite structure according to claim 22, wherein said restraining layer is comprised of glass fibers or a blend of glass fibers with fluoropolymer

fibers.

28. The fire-retardant composite structure according to claim 2, wherein at least one of said porous fluoropolymer layer and said structural layer has one of hydroxide, salt, and oxide of an alkali-earth metal mixed therein.

29. The fire-retardant composite structure according to claim 1, further comprising a surface coating layer applied over said fire retardant layer.

30. A fire-retardant material comprising:

a porous fluoropolymer layer; and

a glass veil.

31. The fire-retardant material according to claim 30, wherein said porous fluoropolymer layer and said glass veil are combined together by entanglement.

32. The fire-retardant material according to claim 31, wherein said entanglement is performed by needle punching.

33. The fire-retardant material according to claim 32, wherein said porous fluoropolymer layer and said glass veil are compressed after said needle punching.

34. A vehicle comprised of a fire-retardant composite structure, the fire retardant composite structure comprising:

a fire retardant layer having a porous fluoropolymer layer;

a structural layer; and

a matrix resin impregnated at least partially into said porous fluoropolymer layer and said structural layer such that said porous fluoropolymer layer and said structural layer are attached to one another.